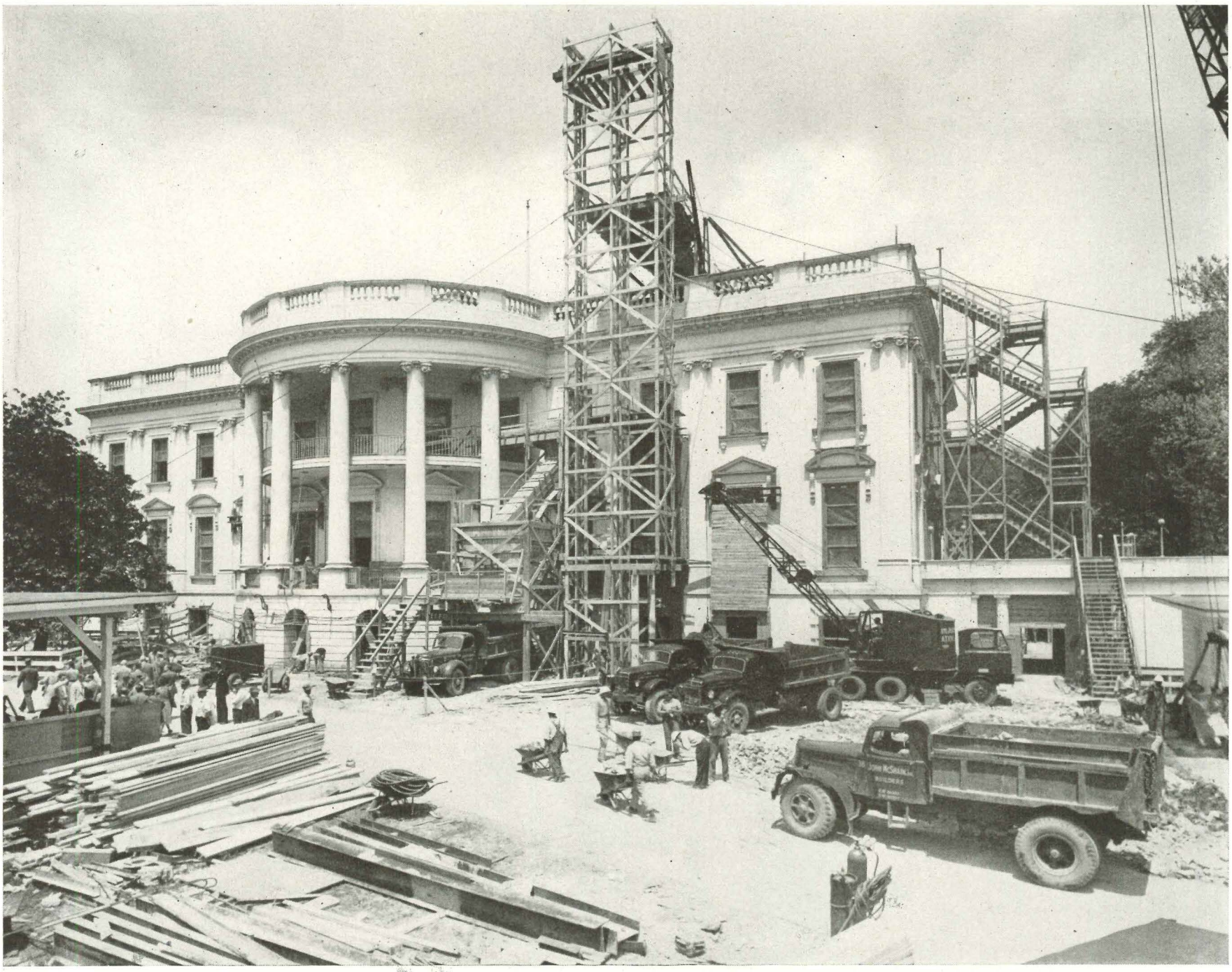
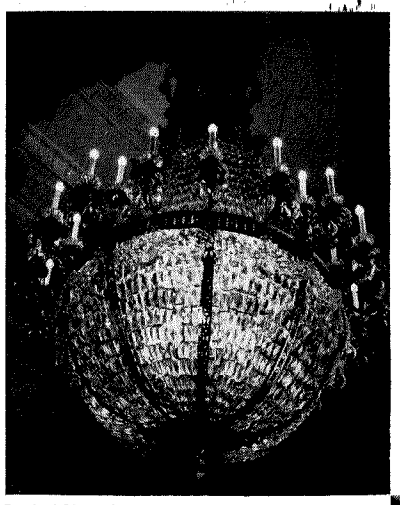
REMODELING JOB AT 1600 PENNSYLVANIA AVENUE

Abbie Rowe—Nat'l. Park Service



For two years White House and grounds were a litter of trucks and trash chutes, sheds and scaffolding. Sidewalk supers peered through the iron fence; leaseholder Truman paid frequent visits. His famous South Portico balcony (center) was left intact.



Indications of impending disaster: massive chandelier danced and tinkled with the crowds as heavy (70 psf) East Room ceiling sagged 6".

Dmitri Kessel

Abbie Rowe—Natl. Park Service

. . . and ancient floor timbers cracked under the weight of Margaret Truman's grand piano. Iron tie clamps were a temporary expedient.

THE new White House is a mere shell of its former self. In fact, after 2⅓ years and $5,761,000 of the public's appropriated cash, a thick exterior shell of Virginia sandstone is all that remains of the original Home of the Presidents, erected 1792. Inside and underneath, the rejuvenated building has the new steel and concrete bones of a skyscraper, the mechanical heart of a super-hotel and the conveniences of a Home of the Future. In interior cubage, it is half again as big as it was before.

But, to the flood of curious visitors the recent reopening has unleashed, the old place looks pretty much the same, with a new coat of paint outside and a certain sparkle inside that wasn't there before. This is as the planners intended it. The ground and first floor public rooms so familiar to millions of Americans were meticulously taken apart, spruced up and replaced, with the subtle substitution here and there of new flooring, new and reupholstered furniture and hangings.

But what, the taxpayer might ask, happened to that six million bucks?

First of all, a good portion of it is hidden in places where the Secret Service frowns on sightseers: behind the woodwork in the form of steel beams, ducts and conduits; in the second and third floor living quarters as new bathrooms, bedrooms, closets; and under ground level—much of the new White House, like an iceberg, is below the surface, underfoot and out of sight. There are two brand new basements and a mechanical area where there was virtually nothing before, housing large-scale storage, service shops, air conditioning, heating, incineration, electrical and water systems. (*See p. 113.*)

There was ample reason for renovation. The Executive Mansion was a shaky old firetrap, scarred and weakened by 157 years of use and abuse, standing more from pride and habit than any valid structural cause. In recent years more than one President had heard the eerie night sounds of old timbers grunting and groaning. President Truman reported an "over-the-waves" sensation when he walked across his second floor study, and crowds noticed the crystal chandeliers swaying and dancing ominously at large receptions. Every time the Marine color guard changed, the floors vibrated.

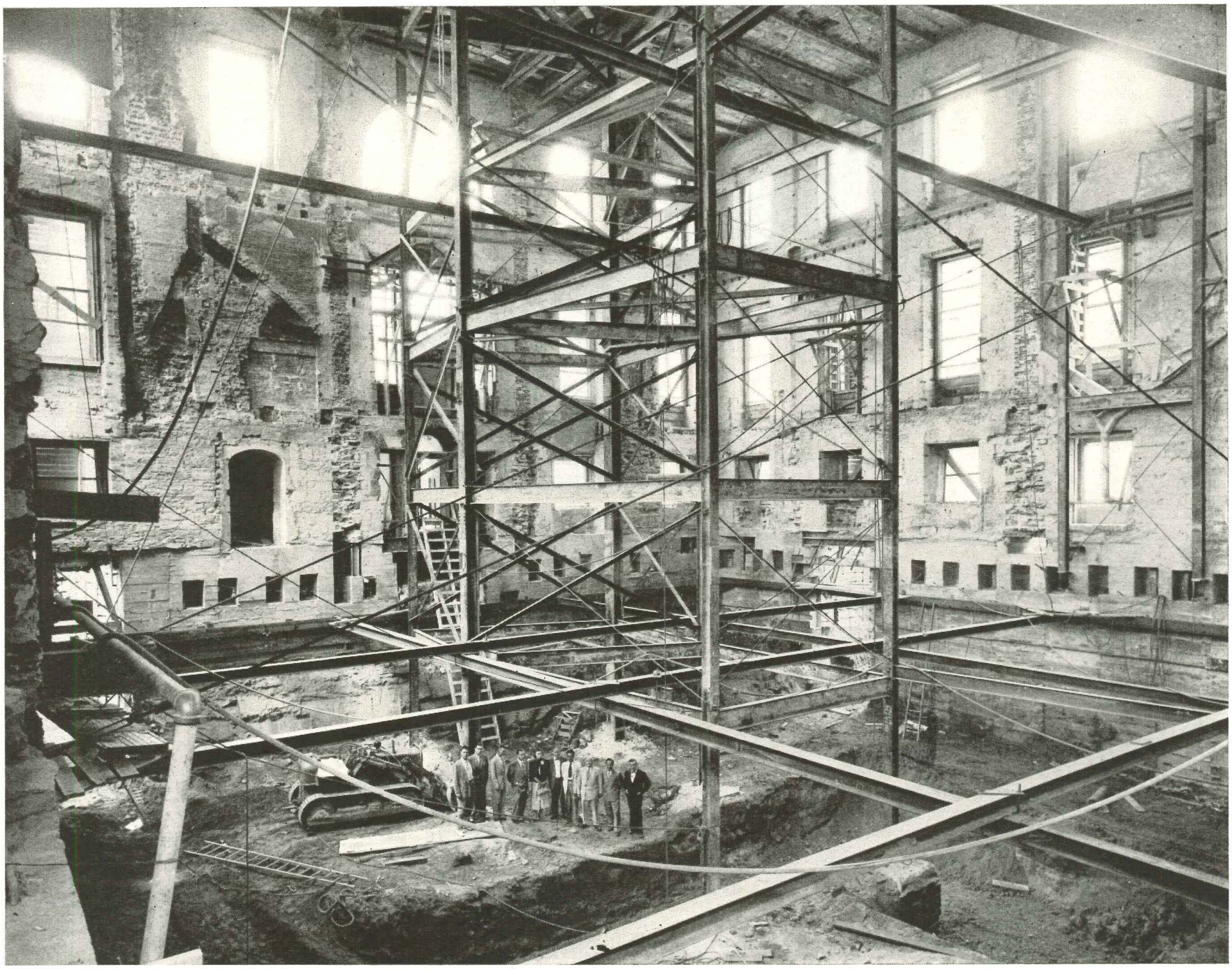
One day in early 1948 Margaret's piano settled slightly over cracking floor timbers, and the East Room ceiling deposited a small pile of plaster dust on the floor. HST's bathtub—directly above one of the reception rooms—was discovered to be sinking slowly into the floor. The President said he "shocked the madam" by suggesting what a scene would have ensued had he come tumbling through the ceiling, wearing nothing but a bathtub, while she was entertaining the Daughters of the American Revolution at tea.

Contrary to rumor, neither the piano nor the tub changed floors abruptly. But Mr. Truman, a 33rd degree Mason who numbers among his hobbies the crafts of architecture and building, began to detect more and more structural faults and in January 1948 asked a committee of architects and engineers to take a careful look. Theirs and subsequent findings:

The original construction was good. For example, 18th Century craftsmen had laid the big sandstone blocks of the outside walls with joints of only 1/16" masonry that would be hard to duplicate today. But after a century and a half of tampering, the whole building was dangerously overloaded and as shot through with holes as a Swiss cheese. Almost every President since Adams had been enthusiastically "improving," punching doors here and there with abandon, boring holes in floor beams, studs and brickwork for pipes and wires, blithely dropping in heavy concrete and tile bathrooms at random on the old floor joists without regard to the structure.

Very nearly the last straw was a weighty steel-truss and tile roof put on in 1927 by Coolidge. In the original design, the top floor had been suspended from the wooden trusses that held up the roof, and these trusses in turn rested on the outer stone walls, which had adequate foundations to carry the load. In the Coolidge renovation a new third floor was put in, built on new beams and trusses of steel. These changes should have added up to greater permanence and strength, **but for one almost fatal error:** some of the trusses were footed on brick interior walls whose foundations were barely strong enough to support their own weight. Nothing gave way at the time, but with the tremendous load pressing down on them, the interior walls started to settle and a destructive load was thrown onto the crumbling central piers.

A 90-ton weight rested directly on one interior brick partition which was only nine inches wide at second floor level, was



Abbie Rowe—Courtesy National Park Service

Cavernous interior,
here being inspected by a Commission group,
resulted from gutting of ground,
first and second floors.
Steel posts and shoring held up
third floor and roof
while bulldozers scooped out
two new basement levels.

never intended to be load bearing, and was grounded without any spread footings on 20′ of highly compressible pulpy clay soil. The exterior walls carried much less weight and rested solidly on 8′ spread footings, settling very little over the years.

In short, the middle of the house was dropping out through the bottom. The interior partitions were sinking slowly under their unexpected burdens, cracking apart and pulling away from the more stationary outside walls. When workmen began stripping away plaster late in 1948 they found gaps of 3″ to 5″ between inner and outer walls. Engineers looking over their shoulders said the slightest earth tremor would have sent the whole building crashing down like a house of cards.

Added to innumerable and unwise structural changes, the functions of the White House had multiplied far beyond the architect's original concept. Human traffic steadily increased: as the country's population doubled and trebled, the trickle of visitors to the capitol became a freshet and then a flood, and most of them went through the Mansion during visitors' hours. By the turn of the century, floors were creaking under state

Interior partition tiles (right)
being laid up between new supports
in ground floor hall.
These posts and beams, of steel
encased in concrete fireproofing, are
typical of new inner structure:
an independent, load-bearing frame
extending five floors from bottom basement
to underside of old top story.

receptions of a thousand and more persons, and it became routine procedure to put extra props under the East Room, State Dining Room and Main Hall during those occasions. On Franklin Roosevelt's inauguration day, there was an average of 3,600 well-wishers in the building all day.

Proper ventilation at these peaks was becoming more and more of a problem; even portable air conditioning units failed to relieve the stifling atmosphere inside. The number of sightseers wasn't diminishing either: in the 11 months prior to the 1948 structural survey, no fewer than 440,000 visitors trooped through the main floors during the two-hour daily visiting period. Designed as a residence, the White House was trying to stand up under the traffic of a railroad terminal.

By September 1948 it was obvious that the combustible second floor was not the only trouble. Inspection holes cut into the floors, walls and ceilings during the $50,000 survey showed that first estimates (around $1,000,000) were sorrowfully low, exhumed long-buried mistakes that boosted the probable renovation sum to $5,400,000.

When this stunning figure was released, the shaky old House was all but overcome by an avalanche of mail and highly vocal opinions. People were in an indignant tizzy; no one had realized that such difficulties could have been suddenly discovered in the famous White House. Some wanted to tear it down completely and build a new and different one from scratch; others suggested preserving it as a museum and offices only and moving the Presidential family to a suburban White House up the Potomac, something that would serve the President as Chequers (with offices at 10 Downing Street) serves the British Prime Ministers.

Early in 1949 Congress passed Public Law No. 40 creating a bipartisan Commission on Renovation of the Executive Mansion. Chosen were Senators McKellar and Martin, Representatives Rabaut and Keefe (since deceased, replaced by J. Harry McGregor, R, Ohio), and the President appointed two member-consultants: Douglas W. Orr, then president of the AIA, and Richard E. Dougherty, ASCE president. The Commission had estimates presented by the Public Buildings Service for 1) a totally new structure; 2) a complete demolishing and rebuilding of the existing structure, salvaging and re-using the exterior wall materials; 3) a remodeling that would leave exteriors, roof and third floor intact; and 4) a brand new third floor and roof, leaving the exterior walls in place. Had they torn down the old building entirely and replaced it with an "ersatz" White House of new limestone, alike in every detail, the Commission now figures it would have been only about 5% cheaper than the scheme they adopted. (Marble or granite, also considered, would have been considerably more expensive.)

Associated Press

But a new building would not have been the real White House, and the majority of the American people seemed to want to preserve their No. 1 national and historical shrine. In any case, sentiment and symbolic values swung the decision towards preserving the old outside walls, and plans were drawn up by Lorenzo Winslow, AIA, official White House architect, the Public Buildings Service and a raft of structural, mechanical and historical experts.

As executive director and co-ordinating genius of the project the Commission picked Maj. Gen. Glen E. Edgerton, U. S. A. (ret.), who had spent 40 of his 64 years as an Army engineer before going to Iraq as a waterways, flood control and irrigation consultant to the International Bank. (Among his previous jobs: chief engineer for the Alaska Road Commission and the Federal Power Commission, engineer in charge of river and harbor improvement in Florida and the upper Mississippi, Canal Zone Governor 1940-44 during the Third Locks Project.)

Bids and budgets

A public invitation to bid on a cost plus fixed fee basis netted some 40 inquiries, 16 actual bids ranging in fee from $100,000 to $950,000. Contract went to the low bidder, John McShain, Inc. of Philadelphia, who has built more public works in Washington than any other contractor—the Pentagon, National Airport Terminal, new State Department building, Jefferson Memorial. To give a wider spread of bids and more competition, the Commission stipulated that the contractor would have to supply his own small tools, trucks, clerical staff and overhead expenses. This, plus changes in plans, delays and mounting costs, has whittled away McShain's profit to a substantial loss. Says he philosophically, "It has cost our firm a small fortune for the privilege of doing this work."

Before the renovation got under way in December 1949, workmen were hand picked, then screened, photographed and fingerprinted by the Secret Service. With 41 subcontractors and 100-plus different members of 19 AFL unions involved, there was an average of 260 men on the job at any one time, as many as 350 at the peak of operations last year.

During demolition, workmen dug up from under the first floor a marble box obviously intended for discovery some centuries hence. Contents: two 1902 Washington newspapers, seven Indian head pennies, two nickels, a dime, four two cent stamps and a bottle of rye whiskey. The President ordered the box buried under the building again for some later generation. Other incidents as work progressed: the discovery of a sturdy pair of hobnailed shoes some workman had proudly bricked into the Home of the Presidents during a past remodeling; a three-week plasterers' strike; in May 1950 a thick picket line bearing pro-FEPC placards (the tip-off came when Paul Robeson drove up, had his picture taken with picket sign in hand, drove off again).

The original completion time of 660 days stipulated in the contract would have had the general contractor finished and off the job by last September, with finishing crews winding up

ready for occupancy in December. The repeated delays that have prompted tenant Truman to keep a "currycomb" and a "shotgun" after the builders are explained officially by 1) even more difficult reconstruction problems than anticipated, 2) the fine finish-work required, doubly time consuming because one operation had to wait on the completion of another, and mostly 3) the Korean war and subsequent cost rises and tightening of materials. The 660 tons of skyscraper steel had been bought before Korea, but priorities on other scarce materials had to be obtained through NPA and were subject to lags.

In November 1950 a cutback revision was made to reduce the over-all cost of the project, and by such economies as substituting limestone for granite here and there, some $250,000 was saved. But nevertheless, two more appropriations were found necessary as work progressed, one for $261,000 and another for $100,000, bringing the total up to its present figure of $5,761,000. The "overrun" beyond first estmates, says the Commission, represented only about 7-8%, "reasonable" by today's standards for big building. As it was, contractor McShain who was originally required to do 15% of the total work on the job, wound up doing nearer 40% and towards the end keeping a double force overtime at his own expense to get the work finished in time for the President to entertain Queen Juliana.

Wrecking with respect

The actual renovation was a sort of architectural dentistry, a beam by beam replacement of virtually the entire structure. Everything had to be done with kid gloves lest the whole building come crashing down or some of the ornamental detailing be broken apart. Explains Murray Bonham, carpenter's foreman, "The idea was to wreck the White House gently, *without* any TNT. Whenever the men on the walls got too rough, I'd make them come down and put them to work on the wheelbarrows. I'd explain we weren't wrecking a tenement and they'd get the idea."

Doors, hardware, furnishings, paneling and decorations were carefully removed, packed and stored, the rugs sent to New York, the famous paintings and historic fittings to the basement of the Smithsonian Institution. Most of the ornamental plaster designs on walls and ceilings had cheesecloth backing, which enabled the crews of sculptors and craftsmen to remove many of them intact. (After the designs were removed, about 25% of them were shellacked and covered with a gelatin that hardened into a mold. From these molds the new plaster casts were made on site, sharpened into more precise detail than the originals, which had been dimmed by coat after coat of paint. The other 75% was replaced without alteration, and the whole bill came to something like $70,000.)

New lifts for old sags

As the dismantling progressed, vertical tie rods were used to hold floors together and a complex steel crisscross of shoring was introduced to prevent collapse. Borings down to 100′ had revealed a solid gravel stratum 18′ thick under the 25′ of soft clay, so interior piers and exterior wall foundations were poured in pits dug down to this level. Heavy steel H columns were swung in through the lower doors in sections and assembled in place on the new separate footings inside, extending upward the full height of the cavernous interior to support the beams and trusses of the top story.

Another delicate maneuver was shifting the weight of the old outside walls to new foundations, contracted, along with the shoring, to the New York firm of Spencer, White & Prentis. "Quite a job," says Edgerton. "We would dig a series of pits 4′ square and 27′ deep down to gravel at intervals around the exterior, then pour them full of concrete. When these had set we would dig another set of pits elsewhere and so on until we had a continuous foundation consisting of 126 separate pits joined together." As the independent, load-bearing steel skeleton went up inside the shell, this new underpinning and the old walls were tied to it by heavy anchor bars. Thus the outer walls became, in effect, curtain walls.

One of the greatest gains of the entire renovation was new basement space, two full floors of it (roughly 350,000 cu. ft.), made possible by bulldozing out 10,000 cu. yds. of clay dirt almost to the bottom of the new foundations. Taken as a whole, the operation was an ingenious engineering trick: gutting the old insides of the building, while holding up third floor and roof, scooping out basement levels underneath, shifting the whole 85′ x 175′ masonry box to new foundations.

Planning for such an extensive project was laborious: 190 architectural drawings, 518 shop drawings, well over 1,000 each of structural and mechanical diagrams. A further complication: each President had had his piecemeal remodeling work done under the aegis of a different agency, and the architects had no clear up-to-date records to work from, other than 18th Century sketches and the McKim, Mead & White report of the 1902 renovation.

The innovations

Today, four years after the idea first took form, the new White House has close to 1½ million cu. ft. of interior space (excluding the two big office wings), where it had 1 million before. Thanks to the recent improvements and the declining value of the dollar, its total valuation including 17 acres of grounds has gone up appreciably from a figure of $26 million quoted in 1940—to probably between $40 and $60 million, although no recent appraisal has been made. With its vast new mechanical plant and 72 (ten new) employees, it will cost $367,200 to run for fiscal 1953, an increase of $100,000 over fiscal 1951. (The electricity bill alone will amount to $38,890.)

Counting the rooms as you would in a normal house, there are 54 rooms and 16 baths, as opposed to 48 rooms and 14 baths in 1949. The full breakdown, including storerooms and basement space:

	rooms	corridors, halls	baths	lavatories
new	107	40	19	12
old	62	26	14	6

What's new, by floors, starting from the bottom (security prohibits publication of some floor plans):

Mechanical area (approx. 160,000 cu. ft. under the lawn, enlarged from the previous installation): transformer room, electrical repair shop, carpenter shop, compressor rooms for the air conditioning system. To carry an estimated cooling load of 300 tons of refrigeration, two centrifugal compressors were installed, each with an 1,800 r.p.m. motor and a 200 ton capacity. One can provide continuous cooling in case the other is out of service for repairs.

Basement: storage rooms, laundry, engineers' office, dentist's office, control room, water softener, men's and women's locker rooms and lavatories, incinerator, elevator machinery.

Basement mezzanine: storage rooms, barber shop, valet, servants' dining room, men's and women's lavatories. Five separate heating and air conditioning units have ducts big enough for two men to sit in, are linked to a central control and to thermostatic controls that allow different temperatures in different rooms. In winter all rooms in the building are warmed by preheated air; second and third floors are equipped with hot water convectors as well. The air units are designed to keep such spaces as the huge East Room at the proper temperature whether there are two or two thousand people in the building. Steam for heating the water for the convectors is supplied by two sets of connections running from a government central heating plant into both east and west sides of the building. The new systems replace four types of heat used in the old building: steam, hot water, hot air and electric.

Ground floor *(see plan):* principal renovations here were a big new white-tiled kitchen that can serve up to 100 extra guests, with stainless steel refrigerators, steam tables, ovens, fluorescent lighting and a theater-size electrical control board. Also new: a three-room doctor's suite, two new freight elevators and two new stairways to the basements. Two new "sidewalk" elevators were installed outside for easy access to the basements.

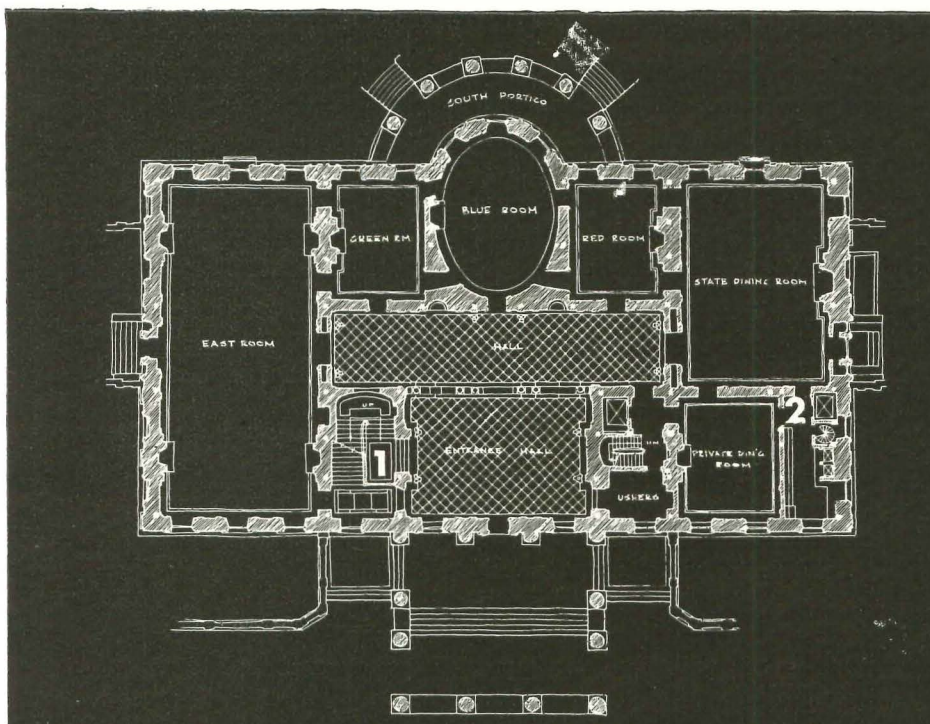
First (main) floor *(see plan):* major architectural change was converting the old main staircase from a narrow-width split-run design, facing on the inner hall, to a wider, single-width stair that can be entered more conveniently from the front entrance hall. Butler's pantry has a new service elevator.

Second floor: new living quarters for the Presidential family will at long last have enough closets, in the new space provided by replacing the thick interior partitions of brick with thinner steel construction. Also noiseless toilets, glassed-in tub-showers, new furniture, outlets for TV sets.

Third (top) floor: by raising the four corners of the 1927 hip roof, it was possible to add four new rooms, more storage space. Nestled behind the big stone balustrade and scarcely noticeable from the street, the old wooden solarium has been replaced with a polygonal metal one that has large picture windows overlooking the Potomac, bamboo furniture and blue-green walls. Hidden from worm's-eye view, it is not likely to offend architectural purists who complained so bitterly about the famous "Truman balcony" on the south portico.

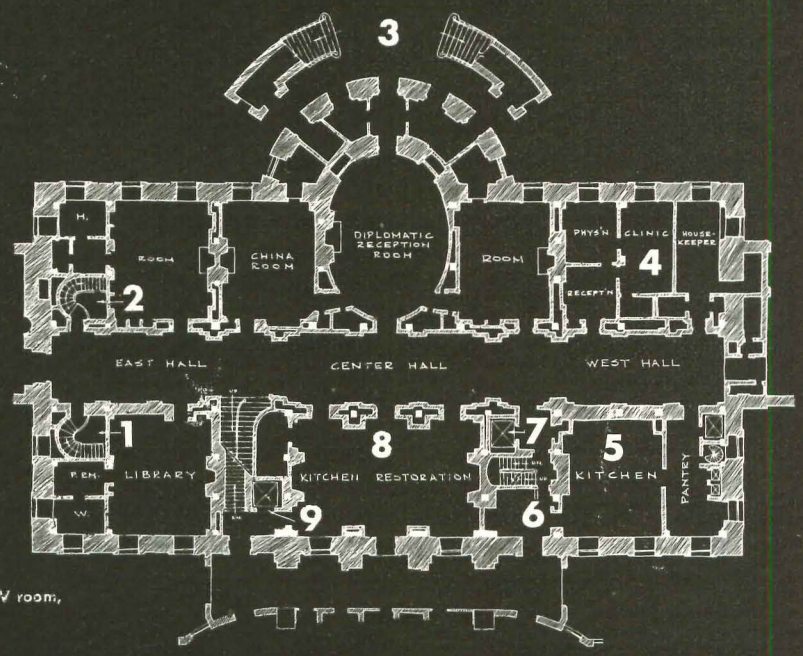
Preserving the original interior dimensions of the historic ground and main floor rooms to within two or three inches

(Continued on page 142)



First, or main floor is almost identical to old layout, with:

1. a new stair design, facing entrance hall instead of central corridor
2. new service elevator in pantry



New ground floor is basically the same, with:

1. } new stairs to basement,
2. }
3. storage and toilet rooms under South Portico,
4. doctor's suite and housekeeper's office,
5. renovated kitchen and pantry,
6. refrigerator room,
7. passenger elevator in the same location,
8. old kitchen restored and now used for a broadcasting and TV room,
9. a new elevator to the basement.